CIVIL ENGINEERING, B.S.

Civil engineers are responsible for the sustainable design of facilities that protect the health and welfare of communities and the environment, while also ensuring society's financial health. More specifically, they are responsible for the conception, design, and construction of public works such as:

- the highways, streets, and bridges that we walk, bike, and drive on
- the water systems and earthworks that treat the water we drink, manage the water we swim in and boat on, and protect us and our property from floodwaters
- the homes, schools, factories, theaters, and stadiums in which we live, learn, work, and play
- the airports, railways, waterways, and harbors that provide additional mobility for people and the materials they produce and consume
- the treatment and emission systems that ensure the safety of the air we breathe
- the recycling, reuse, and disposal systems used to minimize the production of and also provide for the containment of the solid and hazardous wastes we produce
- the production and transmission facilities for the electricity we use, including generation facilities for both conventional and renewable energy sources

Civil engineers are also responsible for the operation of these facilities, an aspect of the field that is being rapidly integrated into the Internet of Things with real-time "big data" collection systems for automated control. This makes it possible for society to rely on:

- autonomous cars, trucks, and mass transport systems, providing safer travel with reduced traffic congestion, improved roadway capacity, reduced energy consumption and air emissions
- smart water infrastructure, including systems that will reduce water consumption, save energy, and improve community resiliency in the wake of natural and human-caused disasters
- intelligent buildings, including systems that reduce energy consumption, improve employee and student comfort, and allow for adaptation of structural systems to changing wind and seismic loads

All of the above items require a core knowledge in mathematics, statistics, physics, chemistry, biology, geology, computer science and computer design tools, as well as breadth in the different civil engineering disciplines. These disciplines include construction engineering and management, environmental engineering, geological and geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Civil engineers perform their work in an interdisciplinary setting requiring strong written and verbal communication skills, understanding of professional and ethical obligations coupled with risk management and decision-making, and commitment to lifelong learning and professional licensure.

VISION

Develop and maintain a learning community that pursues new knowledge and understanding, and provides innovative and sustainable solutions to human and ecological needs.

MISSION OF BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE) PROGRAM

Create, integrate, and transfer civil engineering knowledge and practice in the development of professionals, leaders, and citizens that help define and serve societal and environmental needs by applying this knowledge and practice in an effective and sustainable manner.

CIVIL ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES

Prepare BSCE graduates to contribute to their communities through the following career and professional accomplishments:

1. Design and construct both natural and built processes and systems to efficiently meet determined needs using technical knowledge; modern tools; design principles; ethical practice; and communication, leadership, and team skills.
2. Utilize measurement and analysis tools along with experimental data in investigating natural and built systems.
3. Understand and incorporate economic, environmental, political, social, safety and global considerations in design, investigation and construction of natural and built systems.
4. Engage in lifelong learning to keep pace with the continuous evolution of policies, procedures, technologies and tools for engineering analysis, design, and decision making.
5. Serve others through participation in professional and/or civic activities and responsibilities.

HOW TO GET IN

ADMISSION TO THE COLLEGE AS A FRESHMAN

Students applying to UW–Madison (https://www.admissions.wisc.edu/apply/) need to indicate an engineering major (https://engineering.wisc.edu/degrees-programs/undergraduate/) as their first choice in order to be considered for direct admission to the College of Engineering. Direct admission to a major means students will start in the program of their choice in the College of Engineering and will need to meet progression requirements (https://engineering.wisc.edu/student-services/undergraduate-student-advising/progression/) at the end of the first year to guarantee advancement in that program.

CROSS-CAMPUS TRANSFER TO ENGINEERING

UW–Madison students in other schools and colleges on campus must meet minimum admission requirements (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/) for admission consideration to engineering degree granting classifications. Cross-campus admission is competitive and selective, and the grade point average expectations may increase as demand trends change. The student's overall academic record at UW–Madison is also considered. Students apply to their intended engineering program by submitting the online application by stated deadlines for spring and fall. The College of Engineering offers an online information tutorial and drop-in advising (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/) for students to learn about the cross-campus transfer process.

OFF-CAMPUS TRANSFER TO ENGINEERING

With careful planning, students at other accredited institutions can transfer coursework that will apply toward engineering degree

requirements at UW–Madison. Off-campus transfer applicants are considered for direct admission to the College of Engineering by applying to the Office of Admissions with an engineering major listed as their first choice. Those who are admitted to their intended engineering program must meet progression requirements (https://engineering.wisc.edu/admissions/undergraduate/transfer-from-off-campus/) at the point of transfer or within their first two semesters at UW–Madison to guarantee advancement in that program. A minimum of 30 credits in residence in the College of Engineering is required after transferring, and all students must meet all requirements for their major in the college. Transfer admission to the College of Engineering is competitive and selective, and students who have exceeded the 80 credit limit at the time of application are not eligible to apply.

The College of Engineering has dual degree programs with select four-year UW System campuses. Eligible dual degree applicants are not subject to the 80 credit limit.

Off-campus transfer students are encouraged to discuss their interests, academic background, and admission options with the Transfer Coordinator in the College of Engineering: ugtransfer@engr.wisc.edu or 608-262-2473.

SECOND BACHELOR'S DEGREE

The College of Engineering does not accept second undergraduate degree applications. Second degree student (https://engineering.wisc.edu/admissions/undergraduate/adult-students-second-degree-students/)s (https://engineering.wisc.edu/student-services/undergraduate-student-advising/) might explore the Biological Systems Engineering program at UW–Madison, an undergraduate engineering degree elsewhere, or a graduate program in the College of Engineering.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) section of the *Guide*.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

SUMMARY OF REQUIREMENTS

The following curriculum applies to students who were admitted to the civil engineering degree program (classification changed to CEE) in fall 2016 or later.

Code	Title	Credits
Introduction to Engineering		3
Mathematics and Statistics		19
Basic Science		16
Engineering Mechanics		10
Civil Engineering Mechanics		6
Civil Engineering Tools		6
Civil Engineering Breadth		21
Civil Engineering Design		10
Engineering Electives		13
Communications		8
Liberal Studies		16
Total Credits		**128**

INTRODUCTION TO ENGINEERING

Code	Title	Credits
INTEREGR 170	Design Practicum	3
Total Credits		**3**

MATHEMATICS AND STATISTICS REQUIREMENT

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	5
or MATH 217	Calculus with Algebra and Trigonometry II	
or MATH 275	Topics in Calculus I	
MATH 222	Calculus and Analytic Geometry 2	4
or MATH 276	Topics in Calculus II	
MATH 234	Calculus--Functions of Several Variables	4
One of the following courses:		*3*
STAT 324	Introductory Applied Statistics for Engineers	
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
One of the following advanced mathematics courses:		*3*

MATH 319	Techniques in Ordinary Differential Equations	
MATH 320	Linear Algebra and Differential Equations	
Total Credits		**19**

BASIC SCIENCE REQUIREMENT

Code	Title	Credits
One of the following:		*5*
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
CHEM 109	Advanced General Chemistry	
One of the following:		*5*
PHYSICS 202	General Physics	
PHYSICS 208	General Physics	
One of the following:		*3*
GEOSCI 100	Introductory Geology: How the Earth Works	
GEOSCI/ ENVIR ST 106	Environmental Geology	
One of the following:		*3*
ZOOLOGY/ BIOLOGY/ BOTANY 151	Introductory Biology	
ZOOLOGY 153	Introductory Biology	
ZOOLOGY/ BOTANY/ ENVIR ST 260	Introductory Ecology	
MICROBIO 101	General Microbiology	
Total Credits		**16**

ENGINEERING MECHANICS REQUIREMENT

Code	Title	Credits
E M A 201	Statics (with a grade of C or better)	3
E M A 202	Dynamics	3
or M E 240	Dynamics	
E M A 303	Mechanics of Materials	3
or M E 306	Mechanics of Materials	
E M A/M E 307	Mechanics of Materials Lab	1
Total Credits		**10**

CIVIL ENGINEERING MECHANICS REQUIREMENT

Code	Title	Credits
CIV ENGR 310	Fluid Mechanics	3
CIV ENGR/ E M A 395	Materials for Constructed Facilities	3
Total Credits		**6**

CIVIL ENGINEERING TOOLS REQUIREMENT

Code	Title	Credits
CIV ENGR 159	Civil Engineering Graphics (was M E 170 before Fall 2023)	2-3
or M E 231	Geometric Modeling for Design and Manufacturing	
CIV ENGR/G L E 291	Problem Solving Using Computer Tools	4
Total Credits		**6-7**

CIVIL ENGINEERING BREADTH REQUIREMENT

Code	Title	Credits
CIV ENGR 311	Hydroscience	3
CIV ENGR 320	Environmental Engineering	3
CIV ENGR/ G L E 330	Soil Mechanics	3
CIV ENGR 340	Structural Analysis I	3
CIV ENGR 370	Transportation Engineering	3
CIV ENGR 494	Civil and Environmental Engineering Decision Making	3
CIV ENGR 498	Construction Project Management	3
Total Credits		**21**

CIVIL ENGINEERING DESIGN REQUIREMENT

Code	Title	Credits
CIV ENGR 578	Senior Capstone Design	4
Every student must take at least one class in at least two of the following CEE disciplines, for a total of 6 credits. One of the two classes MUST be completed BEFORE taking CIV ENGR 578 Senior Capstone Design.		6
Water Resources		
CIV ENGR 414	Hydrologic Design	
Environmental		
CIV ENGR 426	Design of Wastewater Treatment Plants	
CIV ENGR 427	Solid and Hazardous Wastes Engineering	
CIV ENGR 428	Water Treatment Plant Design	
CIV ENGR 522	Hazardous Waste Management	
Structural		
CIV ENGR 445	Steel Structures I	
CIV ENGR 447	Concrete Structures I	
Geological		
CIV ENGR/ G L E 530	Seepage and Slopes	
CIV ENGR/ G L E 532	Foundations	
Transportation		
CIV ENGR 573	Geometric Design of Transport Facilities	
CIV ENGR 574	Traffic Control	
CIV ENGR 576	Advanced Pavement Design	
Note: If a student takes three or more courses from the above list, two of those courses will count toward this civil engineering design requirement and the other classes will count towards the electives requirement (see section below).		
Total Credits		**10**

ENGINEERING ELECTIVES REQUIREMENT

1. Students must take at least 3 credits of coursework from an ABET-accredited degree-granting program outside of the Bachelor of Science in Civil Engineering program. INTEREGR and E P D courses do not qualify for meeting this requirement; any courses cross-listed with Civil Engineering (CIV ENGR) do not qualify for meeting this requirement.
2. Students must take at least 3 credits of CEE coursework in addition to the civil engineering design requirement. **Note:** Students in the Construction Engineering Management or Environmental Engineering option programs must select from a set of CIV ENGR courses approved for those options. [1,2,3]
3. Students must take at least 7 credits of coursework that meets at least one of the following[1,2,3]:
   a. Any course offered by an engineering department, including but not limited to CIV ENGR.
   b. Any Intermediate or Advanced level course with a breadth designation of Biological Sciences, Physical Sciences and/or Natural Sciences. These courses cannot also carry a breadth designation of Social Sciences, Humanities or Literature.
   c. Any of the following business courses: INTEREGR 303 Applied Leadership Competencies in Engineering, ACCT I S 300 Accounting Principles, FINANCE/ECON 300 Introduction to Finance, GEN BUS 301 Business Law, M H R 300 Managing Organizations, REAL EST/A A E/ECON/URB R PL 306 The Real Estate Process

Total Credits: 13

1

Up to three credits of CIV ENGR 1 Cooperative Education Program may be used towards Item 2 or 3.

2

Up to six credits of research work (CIV ENGR 299 Independent Study, CIV ENGR 489 Honors in Research, and/or CIV ENGR 699 Independent Study) may be used towards Item 2 or 3.

3

CIV ENGR 150 Introduction to Architectural Theory, CIV ENGR 151 Architectural Making I, CIV ENGR 152 Architectural Making II, CIV ENGR 155 Architectural Thinking, and CIV ENGR 250 Architectural Visualization cannot be used in Items 2 or 3 above.

COMMUNICATIONS

Code	Title	Credits
Communications A (choose one)		*3*
ENGL 100	Introduction to College Composition	
LSC 100	Science and Storytelling	
COM ARTS 100	Introduction to Speech Composition	
ESL 118	Academic Writing II	
Speech-Related Course (choose one)		*2*
E P D 275	Technical Presentations [1]	
COM ARTS 105	Public Speaking	
COM ARTS 181	Elements of Speech-Honors Course	
COM ARTS 262	Theory and Practice of Argumentation and Debate	
COM ARTS 266	Theory and Practice of Group Discussion	
Writing-Related Courses (choose one)		*3*
INTEREGR 397	Engineering Communication	
ENGL 201	Intermediate Composition	
Total Credits		**8**

1

E P D 275 Technical Presentations and INTEREGR 397 Engineering Communication strongly recommended to satisfy these requirements.

LIBERAL STUDIES REQUIREMENTS

Code	Title	Credits
College of Engineering Liberal Studies Requirements		
Complete Requirements (http://guide.wisc.edu/undergraduate/engineering/#requirementstext) [1]		16
Requirements specific to Civil Engineering:		
An economics course must be selected from the following list:		
ECON 101	Principles of Microeconomics	
ECON 102	Principles of Macroeconomics	
ECON 111	Principles of Economics-Accelerated Treatment	
A minimum of three credits of environmental studies course that meets the breadth designations of humanities, literature, and/or social science. Courses that also carry breadth designations of Biological Sciences, Natural Sciences, or Physical Sciences will not count towards this requirement.		
Total Credits		**16**

1

All liberal studies credits must be identified with the letter H, S, L, or Z. Language courses are acceptable without the letter and are considered humanities. An economics elective and an environmental studies elective are required.
Note: See a CEE advisor for additional information.

HONORS IN RESEARCH

Students in civil engineering that have completed at least two semesters on the Madison campus with a cumulative GPA of **at least** 3.5 may apply to participate in the Honors in Research program. Students may register for 1 to 3 credits per semester. A grade of P (Progress) will be assigned each semester until the student completes the honors in research program or drops out of the program, at which time a final grade is assigned (based on research progress and the written thesis, if completed). This becomes the grade for all credits taken in CIV ENGR 489 Honors in Research.

A senior thesis worth 3 credits of CIV ENGR 489 is required. The senior thesis is a written document reporting on a substantial piece of work that is prepared in the style of a graduate thesis. The thesis advisor determines the grade which the student receives for the thesis. A bound copy of the thesis must be submitted to the Department of Civil and Environmental Engineering office to complete the program.

The designation "Honors in Research" will be recorded on the student's transcript if the following criteria are met:

1. Satisfaction of requirements for an undergraduate degree in Civil Engineering.
2. A cumulative grade-point average of at least 3.3.

3. Completion of a total of at least 8 credits in CIV ENGR 489.
4. Completion of a senior honors thesis with a final grade of B or better.

Students interested in the Honors in Research program should contact their advisor or the BSCE chair for more information. Applications to the program are to be submitted to the BSCE chair with a supporting letter from the student's academic and thesis advisors. Decisions regarding acceptance are made by the BSCE chair.

NAMED OPTIONS

Note: Beginning Fall 2023, admission to the Environmental Engineering named option for the Civil Engineering, B.S. will be suspended. Students interested in Environmental Engineering and planning to graduate in 2023-24 or later may apply for the Environmental Engineering, B.S. **(**http://guide.wisc.edu/undergraduate/engineering/civil-environmental-engineering/environmental-engineering-bs/**) program. Please consult your academic advisor.**

View as listView as grid

- CIVIL ENGINEERING: CONSTRUCTION ENGINEERING AND MANAGEMENT **(**HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/ENGINEERING/CIVIL-ENVIRONMENTAL-ENGINEERING/CIVIL-ENGINEERING-BS/CIVIL-ENGINEERING-CONSTRUCTION-ENGINEERING-MANAGEMENT-BS/**)**
- CIVIL ENGINEERING: ENVIRONMENTAL ENGINEERING **(**HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/ENGINEERING/CIVIL-ENVIRONMENTAL-ENGINEERING/CIVIL-ENGINEERING-BS/CIVIL-ENGINEERING-ENVIRONMENTAL-ENGINEERING-BS/**)**

UNIVERSITY DEGREE REQUIREMENTS

Total Degree	To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.
Residency	Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.
Quality of Work	Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies
8. an ability to explain basic concepts in management, business, and public policy
9. an ability to explain the importance of professional licensure
10. an ability to understand common failure mechanisms of a component, process, or system and their causes and prevention

FOUR-YEAR PLAN

SAMPLE FOUR-YEAR PLAN

First Year

Fall	Credits	Spring	Credits
MATH 221	5	MATH 222	4
CHEM 109	5	E M A 201	3
INTEREGR 170	3	CIV ENGR 159 or M E 231	2
or LIBERAL STUDIES		LIBERAL STUDIES or	3
COMMUNICATIONS A	3	INTEREGR 170	
		GEOSCI 100 or 106	3
	16		**15**

Second Year

Fall	Credits	Spring	Credits
MATH 234	4	MATH 319 or 320	3
E M A 202	3	E M A 303 or M E 306	3
CIV ENGR 320	3	E M A/M E 307	1
BIOLOGY ELECTIVE	3	E P D 275	2
STAT 324 or 311	3	CIV ENGR 310	3
		ECON 101, 102, or 111	4
	16		**16**

Third Year

Fall	Credits	Spring	Credits
CIV ENGR 311	3	CIV ENGR 340	3
CIV ENGR/G L E 330	3	CIV ENGR/E M A 395	3

CIV ENGR/G L E 291	4	CIV ENGR 498	3
ETHNIC STUDIES	3	CIV ENGR 370	3
INTEREGR 397	3	PHYSICS 202 or 208	5
	16		**17**

Fourth Year

Fall	Credits	Spring	Credits
CIV ENGR DESIGN ELECTIVE	3	CIV ENGR 578	4
ENGR ELECTIVE	3	CIV ENGR DESIGN ELECTIVE	3
CIV ENGR ELECTIVE	3	ENGR ELECTIVE	3
CIV ENGR 494	3	LIBERAL STUDIES	3
ENV STUDIES ELECTIVE	3	ENGR OUTSIDE OF CIV ENGR	3
ENGR ELECTIVE	1		
	16		**16**

Total Credits 128

ADVISING AND CAREERS

ADVISING

Each College of Engineering program has academic advisors dedicated to serving its students. Program advisors can help current College of Engineering students with questions about accessing courses, navigating degree requirements, resolving academic issues and more. Students can find their assigned advisor on the homepage of their student center.

ENGINEERING CAREER SERVICES

Engineering Career Services (ECS) assists students in identifying pre-professional work-based learning experiences such as co-ops and summer internships, considering and applying to graduate or professional school, and finding full-time professional employment during their graduation year.

ECS offers two major career fairs per year, assists with resume writing and interviewing skills, hosts workshops on the job search, and meets one-on-one with students to discuss offer negotiations.

Students are encouraged to utilize the ECS office early in their academic careers. For comprehensive information on ECS programs and workshops, see the ECS website or call 608-262-3471.

PEOPLE

PROFESSORS

William Likos (Chair)
Soyoung Ahn
Hussain Bahia
Awad Hanna
Gregory W. Harrington
James P. Hurley
Steve P. Loheide II
Katherine (Trina) McMahon
Daniel Noguera
David Noyce
Jae Park
Gustavo Parra-Montesinos
Bin Ran
Jeffrey Russell
James Jay Schauer
Chin H. Wu

ASSOCIATE PROFESSORS

Paul Block
Dante Fratta
Matthew Ginder-Vogel
Andrea Hicks
Xiaopeng Li
Jose Pincheira
Pavana Prabhakar
Christy Remucal
Hiroki Sone
James Tinjum
Daniel Wright

ASSISTANT PROFESSORS

Hannah Blum
Sikai Chen
Jesse Hampton
Nimish Pujara
Mohan Qin
Bu Wang
Haoran Wei
Zhenhua Zhu

See also Civil and Environmental Engineering Faculty Directory (https://directory.engr.wisc.edu/cee/faculty/).

CERTIFICATION/LICENSURE

Licensure as a Professional Engineer is expected of civil engineers. Information on steps needed to obtain licensure is available from the National Council for the Examination of Engineers and Surveyors (NCEES) at https://ncees.org/engineering/.

ACCREDITATION

Accreditation.

Accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/).

Note: Undergraduate Program Educational Objectives and Student Outcomes are made publicly available at the Departmental website. (In this Guide, the program's Student Outcomes are designated by our campus as "Learning Outcomes.")